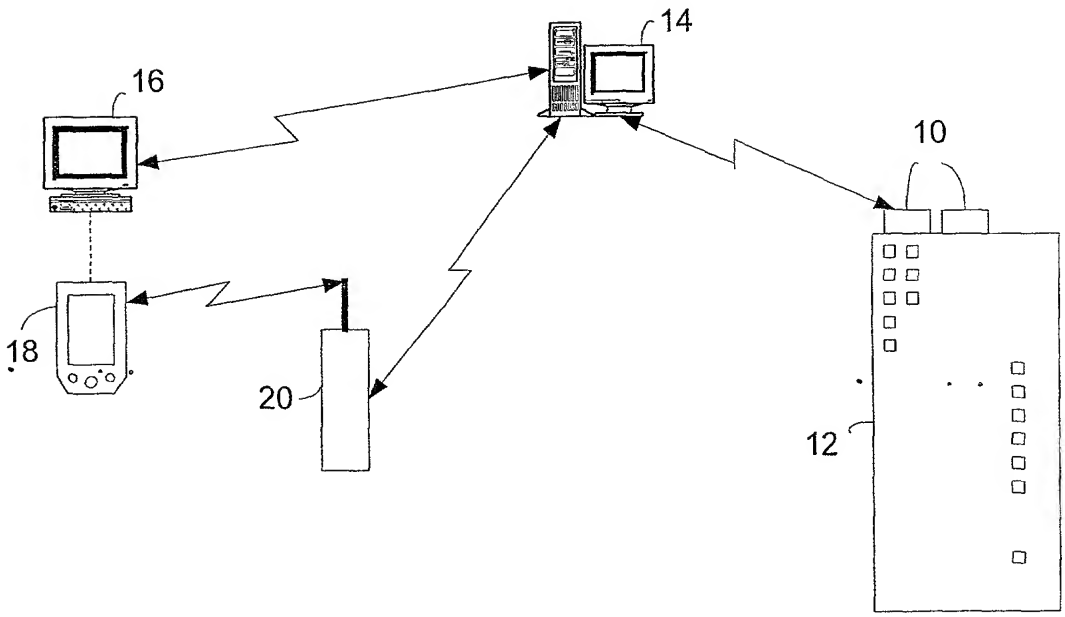

FIG. 1

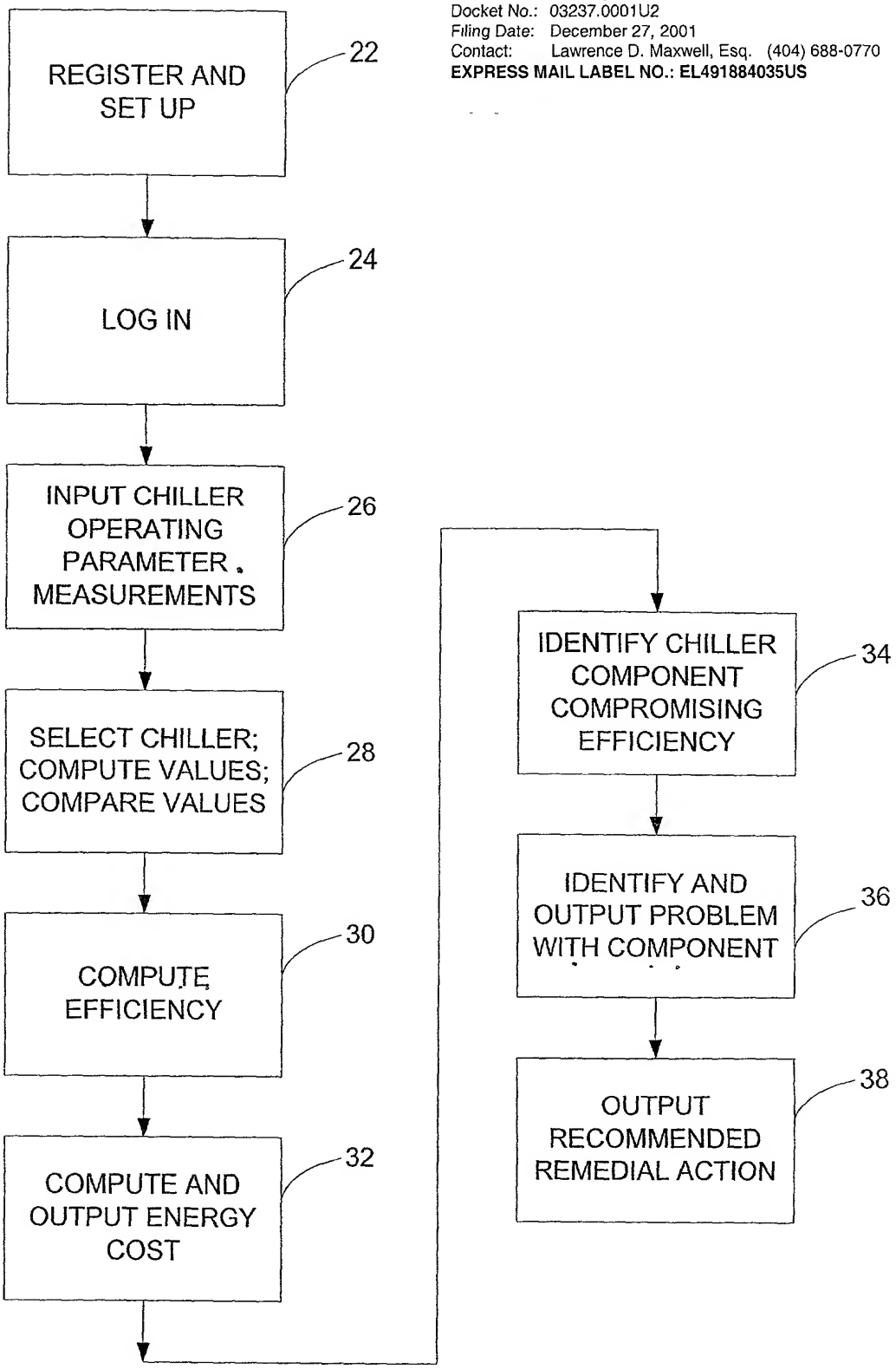
REGISTER AND SET UP
22
LOG IN
24
INPUT CHILLER OPERATING PARAMETER MEASUREMENTS
26
SELECT CHILLER; COMPUTE VALUES; COMPARE VALUES
28
COMPUTE EFFICIENCY
30
COMPUTE AND OUTPUT ENERGY COST
32
IDENTIFY CHILLER COMPONENT COMPROMISING EFFICIENCY
34
IDENTIFY AND OUTPUT PROBLEM WITH COMPONENT
36
OUTPUT RECOMMENDED REMEDIAL ACTION
38

FIG. 2

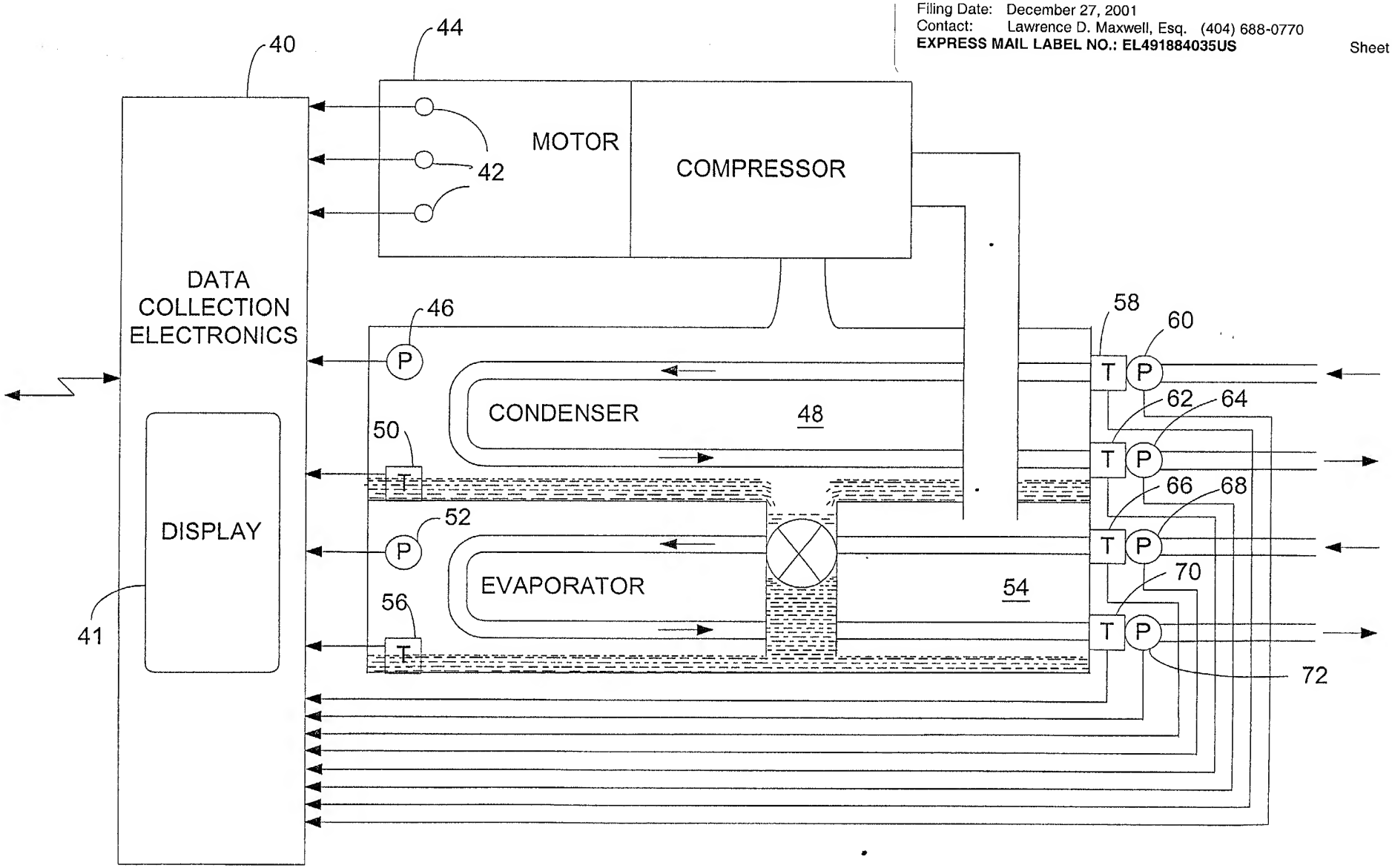
40
44
MOTOR
COMPRESSOR
42
DATA COLLECTION ELECTRONICS
46
P
CONDENSER
48
50
T
DISPLAY
52
EVAPORATOR
54
56
41
58
60
62
64
66
68
70
72

FIG. 3

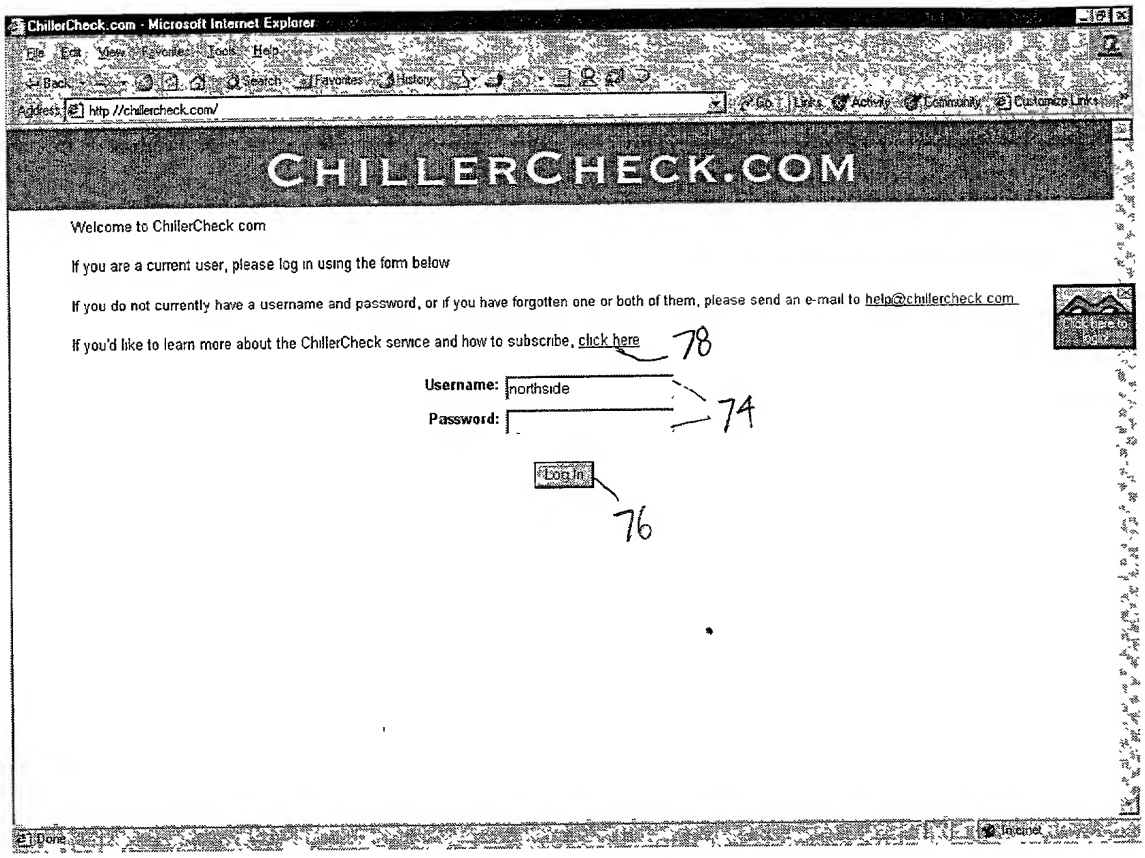
ChillerCheck.com - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://chillercheck.com/
Go Links Activity Community Customize Links
CHILLERCHECK.COM
Welcome to ChillerCheck com
If you are a current user, please log in using the form below
If you do not currently have a username and password, or if you have forgotten one or both of them, please send an e-mail to help@chillercheck.com
If you'd like to learn more about the ChillerCheck service and how to subscribe, click here
78
Username: northside
Password:
74
Log In
76
Done
Internet

FIG. 4

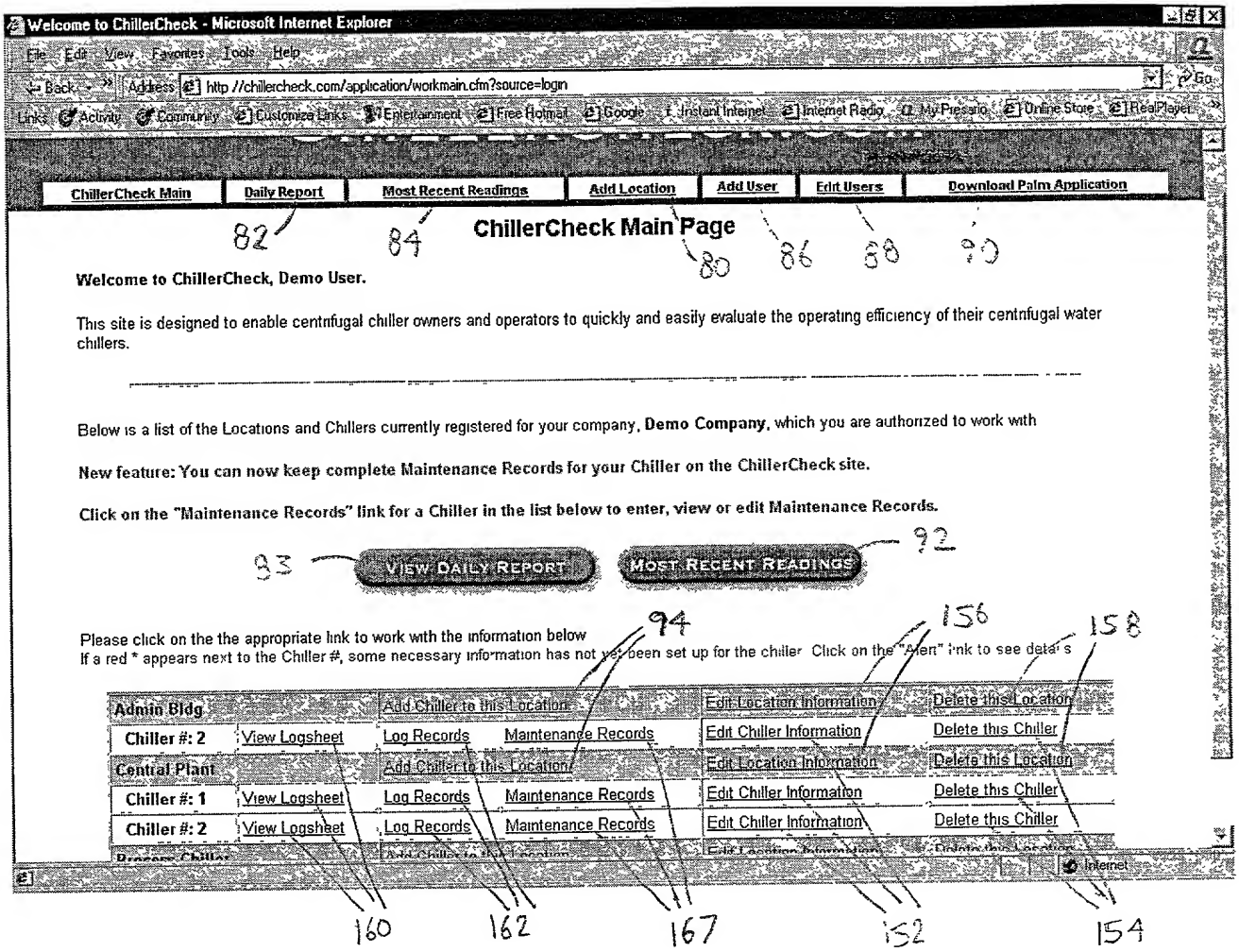
Welcome to ChillerCheck - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://chillercheck.com/application/workmain.cfm?source=login
ChillerCheck Main
Daily Report
Most Recent Readings
Add Location
Add User
Edit Users
Download Palm Application
82
84
ChillerCheck Main Page
80
86
88
90
Welcome to ChillerCheck, Demo User.
This site is designed to enable centrifugal chiller owners and operators to quickly and easily evaluate the operating efficiency of their centrifugal water chillers.
Below is a list of the Locations and Chillers currently registered for your company, Demo Company, which you are authorized to work with
New feature: You can now keep complete Maintenance Records for your Chiller on the ChillerCheck site.
Click on the "Maintenance Records" link for a Chiller in the list below to enter, view or edit Maintenance Records.
93
VIEW DAILY REPORT
MOST RECENT READINGS
92
Please click on the the appropriate link to work with the information below
If a red * appears next to the Chiller #, some necessary information has not yet been set up for the chiller. Click on the "Alert" link to see details
94
156
158
Admin Bldg
Add Chiller to this Location
Edit Location Information
Delete this Location
Chiller #: 2
View Logsheet
Log Records
Maintenance Records
Edit Chiller Information
Delete this Chiller
Central Plant
Add Chiller to this Location
Edit Location Information
Delete this Location
Chiller #: 1
View Logsheet
Log Records
Maintenance Records
Edit Chiller Information
Delete this Chiller
Chiller #: 2
View Logsheet
Log Records
Maintenance Records
Edit Chiller Information
Delete this Chiller
Internet
160
162
167
152
154

FIG. 5

CHILLERCHECK.COM

ChillerCheck Main	Daily Report	Most Recent Readings	Add Location	Add User	Edit Users	Download Palm Application

82 84 80 86 88 90

Add a Chiller at Atlanta Office Bldg.

Please fill in all information in the form below, then click the "Add Chiller" button.

You will then be taken back to the ChillerCheck Main page, where you can work with any of your Location, Chiller or Chiller Log records.

Note: If you do not have all the information below available at this time, you can still add the Chiller by filling out only the required information (marked with a * below) now. You can come back later and add the rest of the information. However, you will not be able to make efficiency calculations or graph trends until all Chiller information has been recorded.

Chiller Information

Help! * Chiller #:	96
* Make:	Choose a Make 98
Help! * Model:	100
Help! Serial #:	102
Help! * Refrigerant Type:	Choose a refrigerant 104
Help! Year Chiller Was Manufactured:	Choose a year of manufacture 106
Help! * Efficiency Rating (kw/ton):	108
Help! * Energy Cost ($/kw hour):	110

FIG. 6A

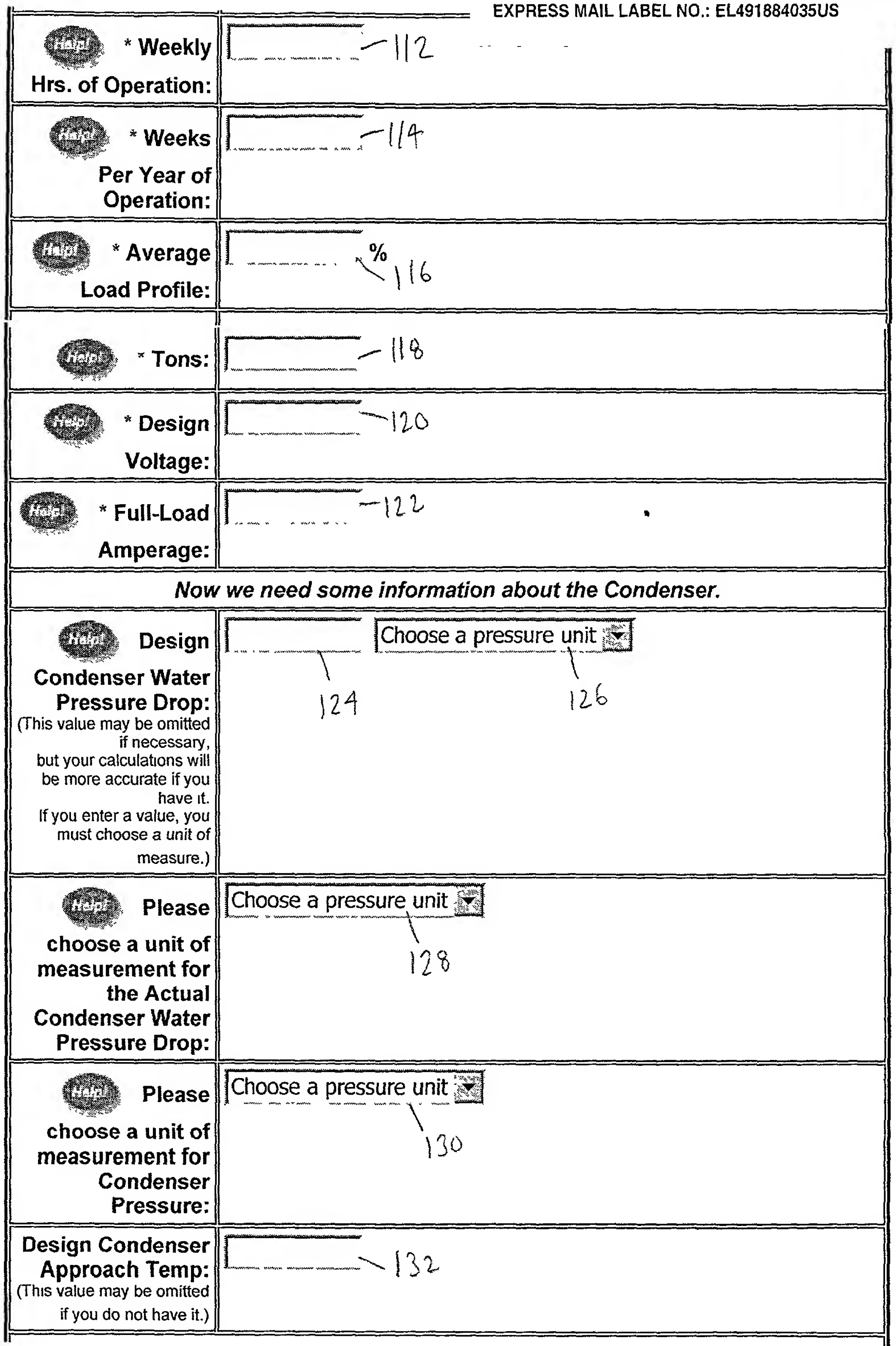
Help!
* Weekly Hrs. of Operation:
112
* Weeks Per Year of Operation:
114
* Average Load Profile:
%
116
* Tons:
118
* Design Voltage:
120
* Full-Load Amperage:
122
Now we need some information about the Condenser.
Design Condenser Water Pressure Drop:
(This value may be omitted if necessary, but your calculations will be more accurate if you have it. If you enter a value, you must choose a unit of measure.)
Choose a pressure unit
124
126
Please choose a unit of measurement for the Actual Condenser Water Pressure Drop:
Choose a pressure unit
128
Please choose a unit of measurement for Condenser Pressure:
Choose a pressure unit
130
Design Condenser Approach Temp:
(This value may be omitted if you do not have it.)
132

FIG. 6B

Now we need some information about the Evaporator.	
Help! **Design Chill Water Pressure Drop:** (This value may be omitted if necessary, but your calculations will be more accurate if you have it. If you enter a value, you must choose a unit of measure.)	Choose a pressure unit (134, 136)
Help! **Please choose a unit of measurement for the Actual Chill Water Pressure Drop:**	Choose a pressure unit (138)
Help! **Please choose a unit of measurement for Evaporator Pressure:**	Choose a pressure unit (140)
Help! **Design Evaporator Approach Temp:** (This value may be omitted if you do not have it.)	(142)
Help! **Evaporator Design Outlet Water Temp:**	(144)
Please choose a method of calculating Oil Pressure Differential for the Compressor.	
Help! **Calculate Differential by:**	Choose a method (146)

FIG. 6C

There are just a few more things we need to know about this chiller.	
Does the chiller have a readout for Purge Run Time?	○ Yes ○ No 143
If so, is the Purge Run Time measured only in minutes, or in both hours and minutes?	○ Minutes Only ○ Hours and Minutes 145
Please set a maximum amount of Purge Run Time per day you wish to allow before you are sent an alert.	Minutes 147
Does this chiller have a readout for Bearing Temperature?	○ Yes ○ No 149
Operator Notes: (Enter any notes you might want to record about this chiller.)	150
Add Chiller Info	

148

FIG. 6D

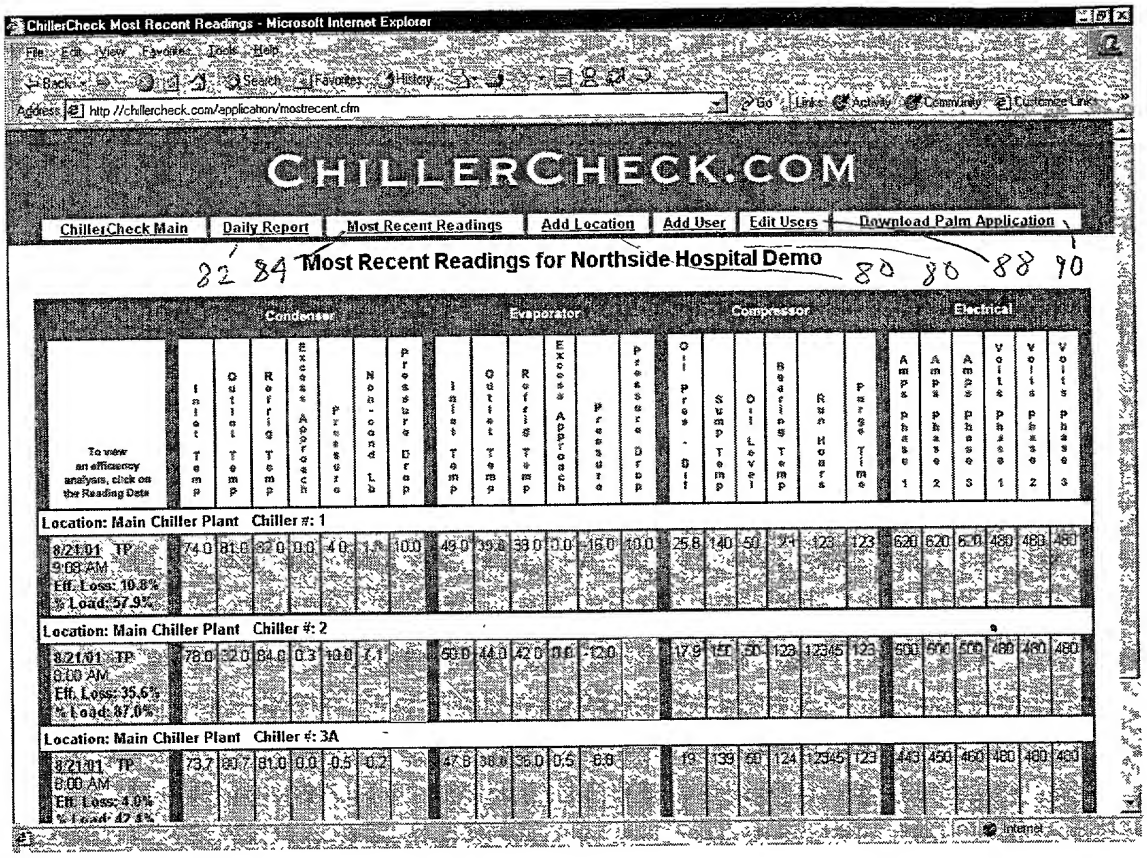
ChillerCheck Most Recent Readings - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://chillercheck.com/application/mostrecent.cfm
CHILLERCHECK.COM
ChillerCheck Main
Daily Report
Most Recent Readings
Add Location
Add User
Edit Users
Download Palm Application
82 84
Most Recent Readings for Northside Hospital Demo
80 80 88 90
Condenser
Evaporator
Compressor
Electrical
To view an efficiency analysis, click on the Reading Date
Inlet Temp
Outlet Temp
Refrig Temp
Excess Approach
Pressure
Non-cond Lb
Pressure Drop
Inlet Temp
Outlet Temp
Refrig Temp
Excess Approach
Pressure
Pressure Drop
Oil Press - Dif
Sump Temp
Oil Level
Bearings Temp
Run Hours
Purge Time
Amps Phase 1
Amps Phase 2
Amps Phase 3
Volts Phase 1
Volts Phase 2
Volts Phase 3
Location: Main Chiller Plant Chiller #: 1
8/21/01 TP 9:08 AM
Eff. Loss: 10.8%
% Load: 57.9%
74.0 81.0 82.0 0.0 4.0 1.8 10.0 49.0 39.8 38.0 0.0 -16.0 10.0 25.8 140 50 24 123 123 620 620 600 480 480 480
Location: Main Chiller Plant Chiller #: 2
8/21/01 TP 8:00 AM
Eff. Loss: 35.6%
% Load: 87.0%
78.0 82.0 84.0 0.3 10.0 7.1 60.0 44.0 42.0 0.6 -12.0 17.9 151 50 123 12345 123 600 670 600 480 480 480
Location: Main Chiller Plant Chiller #: 3A
8/21/01 TP 8:00 AM
Eff. Loss: 4.0%
% Load: 47.4%
73.7 80.7 81.0 0.0 0.5 0.2 47.8 38.0 36.0 0.5 8.8 19 139 60 124 12345 123 440 450 460 480 480 480
Internet

FIG. 7

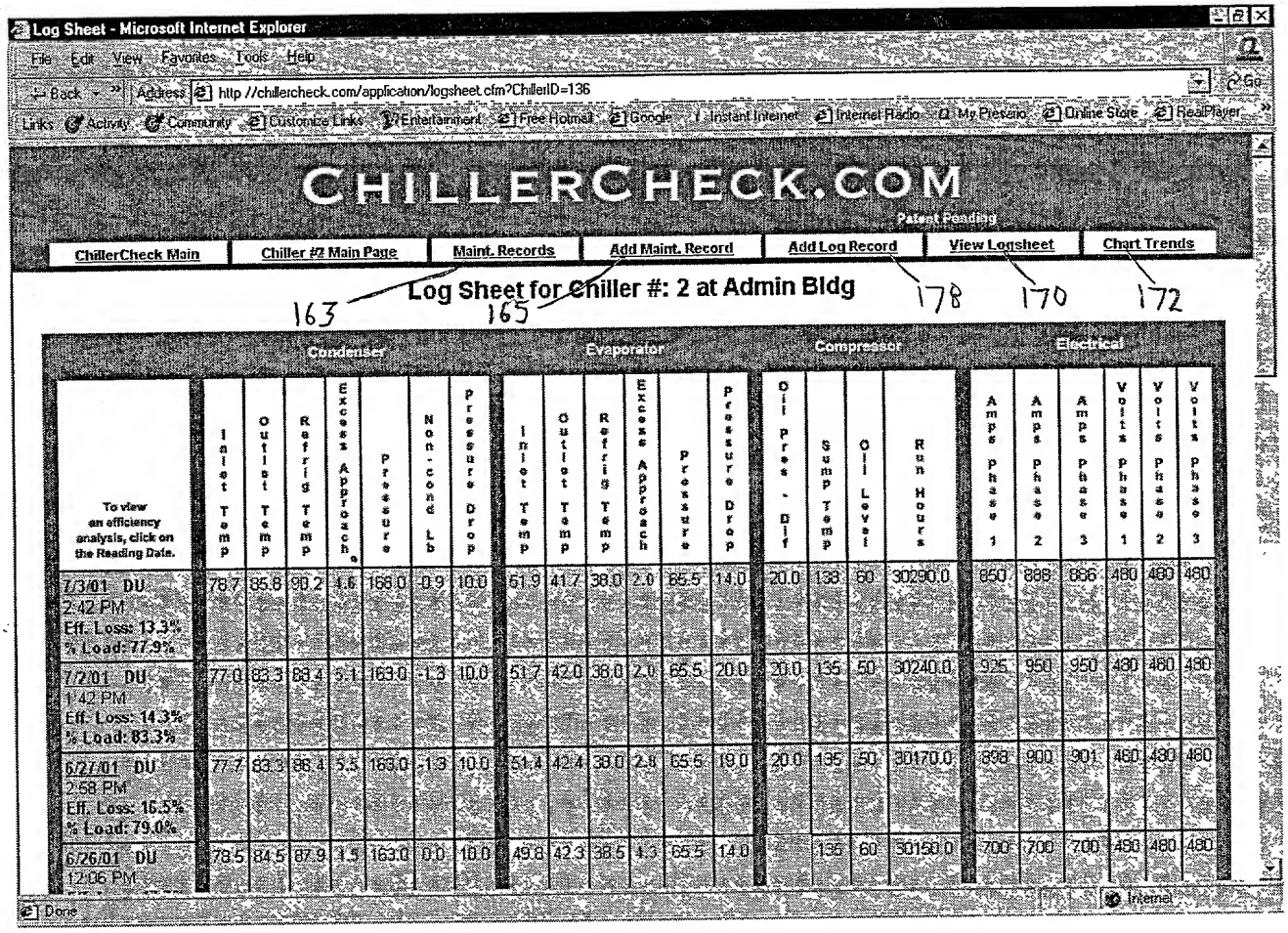

FIG. 8

Inventor: Lawrence J. Seigel
Title: "METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY OF AN AIR CONDITIONING APPARATUS"
Serial No.: Unassigned
Docket No.: 03237.0001U2
Filing Date: December 27, 2001
Contact: Lawrence D. Maxwell, Esq. (404) 688-0770
EXPRESS MAIL LABEL NO.: EL491884035US

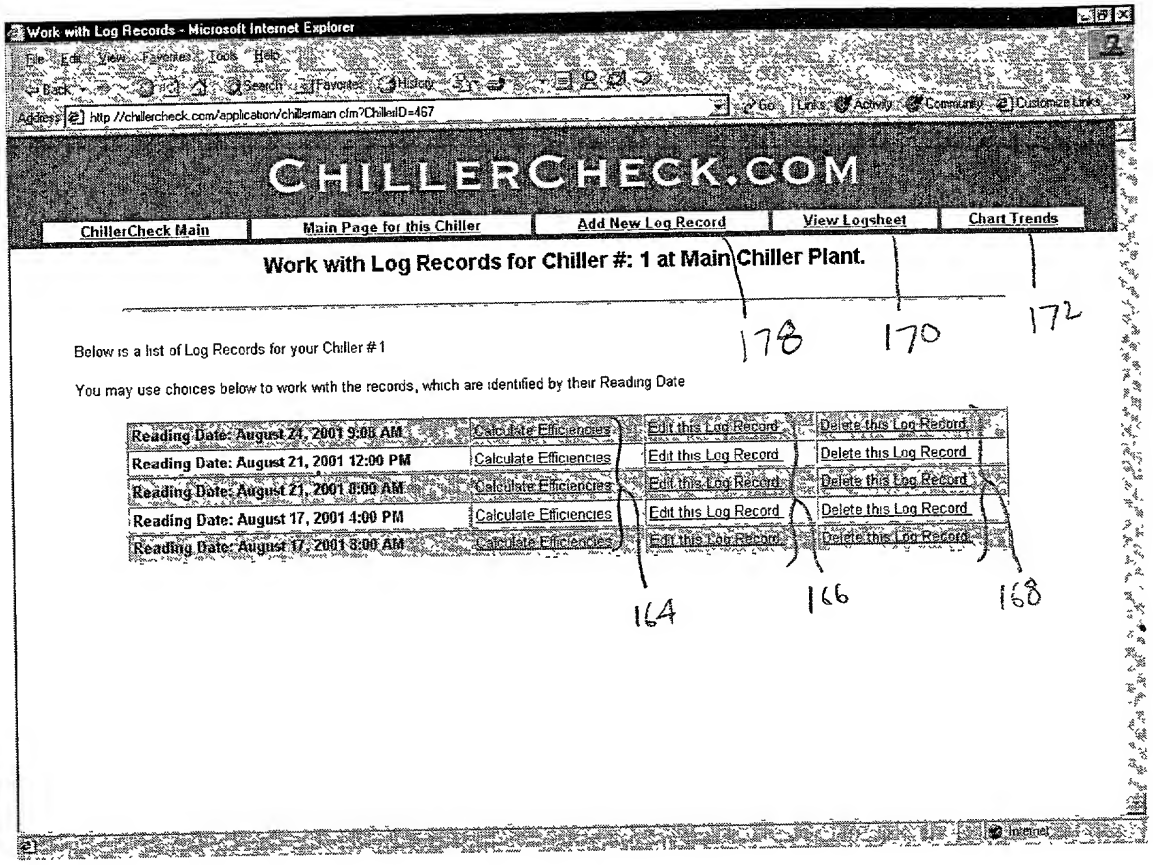
Work with Log Records - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://chillercheck.com/application/chillerman.cfm?ChillerID=467
Go Links Activity Community Customize Links
CHILLERCHECK.COM
ChillerCheck Main
Main Page for this Chiller
Add New Log Record
View Logsheet
Chart Trends
Work with Log Records for Chiller #: 1 at Main Chiller Plant.
Below is a list of Log Records for your Chiller # 1
You may use choices below to work with the records, which are identified by their Reading Date
Reading Date: August 24, 2001 9:00 AM | Calculate Efficiencies | Edit this Log Record | Delete this Log Record
Reading Date: August 21, 2001 12:00 PM | Calculate Efficiencies | Edit this Log Record | Delete this Log Record
Reading Date: August 21, 2001 8:00 AM | Calculate Efficiencies | Edit this Log Record | Delete this Log Record
Reading Date: August 17, 2001 4:00 PM | Calculate Efficiencies | Edit this Log Record | Delete this Log Record
Reading Date: August 17, 2001 8:00 AM | Calculate Efficiencies | Edit this Log Record | Delete this Log Record
178
170
172
164
166
168
Internet

FIG. 9

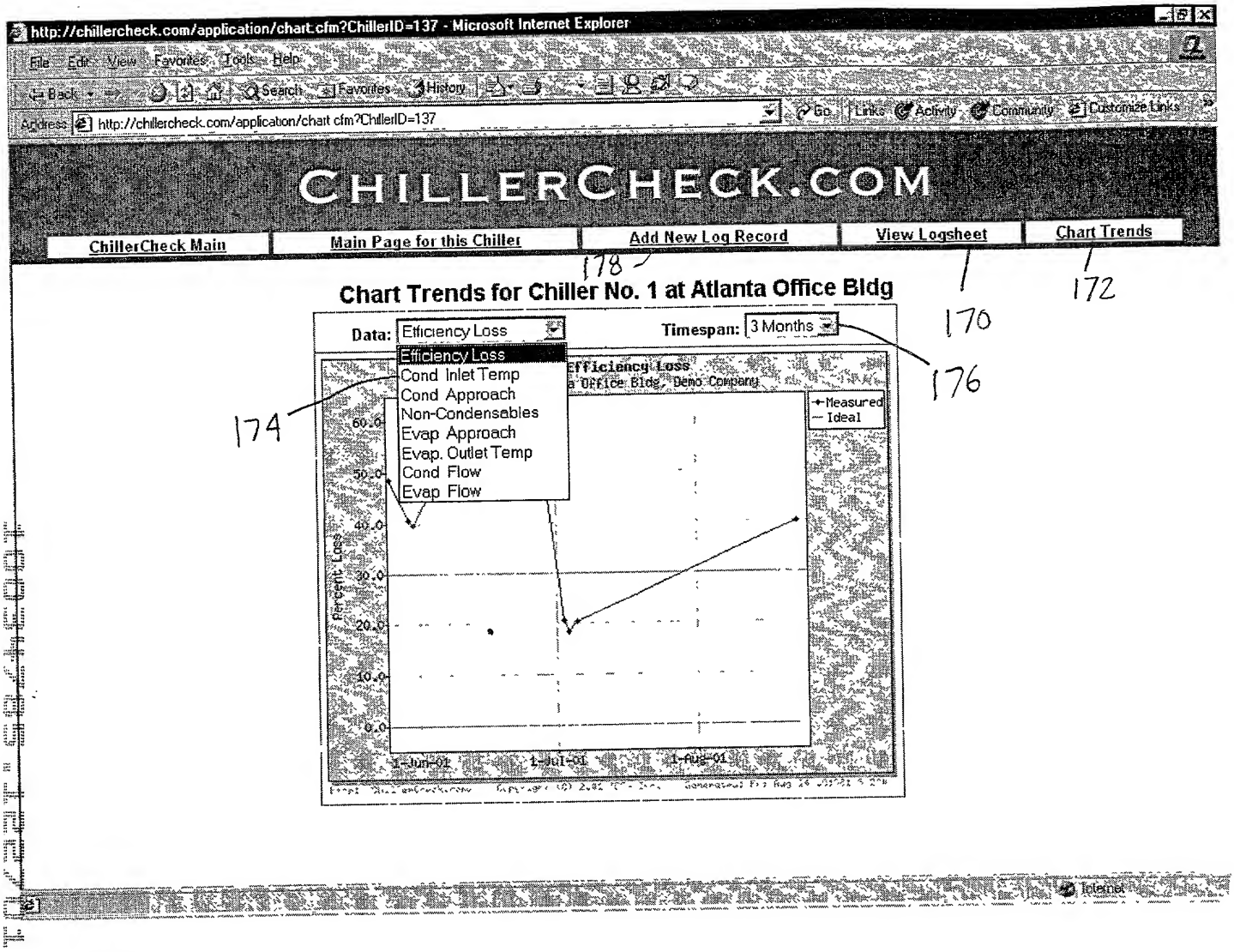
http://chillercheck.com/application/chart.cfm?ChillerID=137 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://chillercheck.com/application/chart.cfm?ChillerID=137
CHILLERCHECK.COM
ChillerCheck Main
Main Page for this Chiller
Add New Log Record
View Logsheet
Chart Trends
178
170
172
Chart Trends for Chiller No. 1 at Atlanta Office Bldg
Data: Efficiency Loss
Timespan: 3 Months
174
176
Efficiency Loss
Cond Inlet Temp
Cond Approach
Non-Condensables
Evap Approach
Evap. Outlet Temp
Cond Flow
Evap Flow
Measured
Ideal
Percent Loss
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1-Jun-01
1-Jul-01
1-Aug-01
Internet

FIG. 10

CHILLERCHECK.COM

ChillerCheck Main | Main Page for this Chiller | Add New Log Record | View Logsheet | Chart Trends

Add a Log Record for Chiller #: 1 at Main Chiller Plant.

178 170 172

Please enter your readings into the form below, then click the "Add Record" button:

Log Record

Operator:	Tim
Reading Date:	August 24, 2001
Reading Time:	9:32 AM
Condenser Readings	
Inlet Water Temp:	°F
Outlet Water Temp:	°F
Refrigerant Temp:	°F
Condenser Pressure:	PSIG
Actual Condenser Water Pressure Drop:	PSIG
Evaporator Readings	
Inlet Water Temp:	°F
Outlet Water Temp:	°F
Refrigerant Temp:	°F
Evaporator Pressure:	In. Hg.
Actual Chill Water Pressure Drop:	PSIG

180 182 184 186 188 190 192 194 196 198 200 202

FIG. 11A

Inventor: Lawrence J. Seigel
Title: "METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY OF AN AIR CONDITIONING APPARATUS"
Serial No.: Unassigned
Docket No.: 03237.0001U2
Filing Date: December 27, 2001
Contact: Lawrence D. Maxwell, Esq. (404) 688-0770
EXPRESS MAIL LABEL NO.: EL491884035US

Compressor Readings	
Oil Pressure (High):	lb. 204
Oil Sump Temp:	°F 206
Oil Level:	% 208
Bearing Temp:	°F 210
Run Hours:	212
Purge Pumpout Time:	214
Electrical Readings	
Amps Phase 1:	216
Amps Phase 2:	218
Amps Phase 3:	220
Volts Phase 1:	222
Volts Phase 2:	224
Volts Phase 3:	226
Operator Notes	
228	
Add Log Record 230	

FIG. 11B

Inventor: Lawrence J. Seigel
Title: "METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY OF AN AIR CONDITIONING APPARATUS"
Serial No.: Unassigned
Docket No.: 03237.0001U2
Filing Date: December 27, 2001
Contact: Lawrence D. Maxwell, Esq. (404) 688-0770
EXPRESS MAIL LABEL NO.: EL491884035US

CHILLERCHECK.COM

Patent Pending

ChillerCheck Main | Chiller #1 Main Page | Maint. Records | Add Maint. Record | Add Log Record | View Logsheet | Chart Trends

163 165 178 170 172

Efficiency Calculation for Chiller #1 at Admin Bldg.
Reading taken on October 10, 2001 at 1:50 PM

Results

Target Cost to Run for Year	$ 54,583
Actual Cost to Run for Year	$ 65,993
Cost of Efficiency Loss	$ 11,410
Efficiency Loss	20.9%

Detailed Cost of Efficiency Loss

Problem	Efficiency Loss	$ Cost	Solution
Fouled Tubes - Condenser	9 5%	$ 5,187	Fix it.
Non-condensables - Condenser	11.4%	$ 6,222	Fix it.

232

Your Condenser Water Flow is 3.6% below design.

Your Evaporator Water Flow is 21.9% below design.

There is an electrical imbalance that may be decreasing the performance of your Chiller.
The voltage imbalance is 3.62%.

The % load at this reading time was 88.9%.

Back to the main page for this Chiller.

FIG. 12

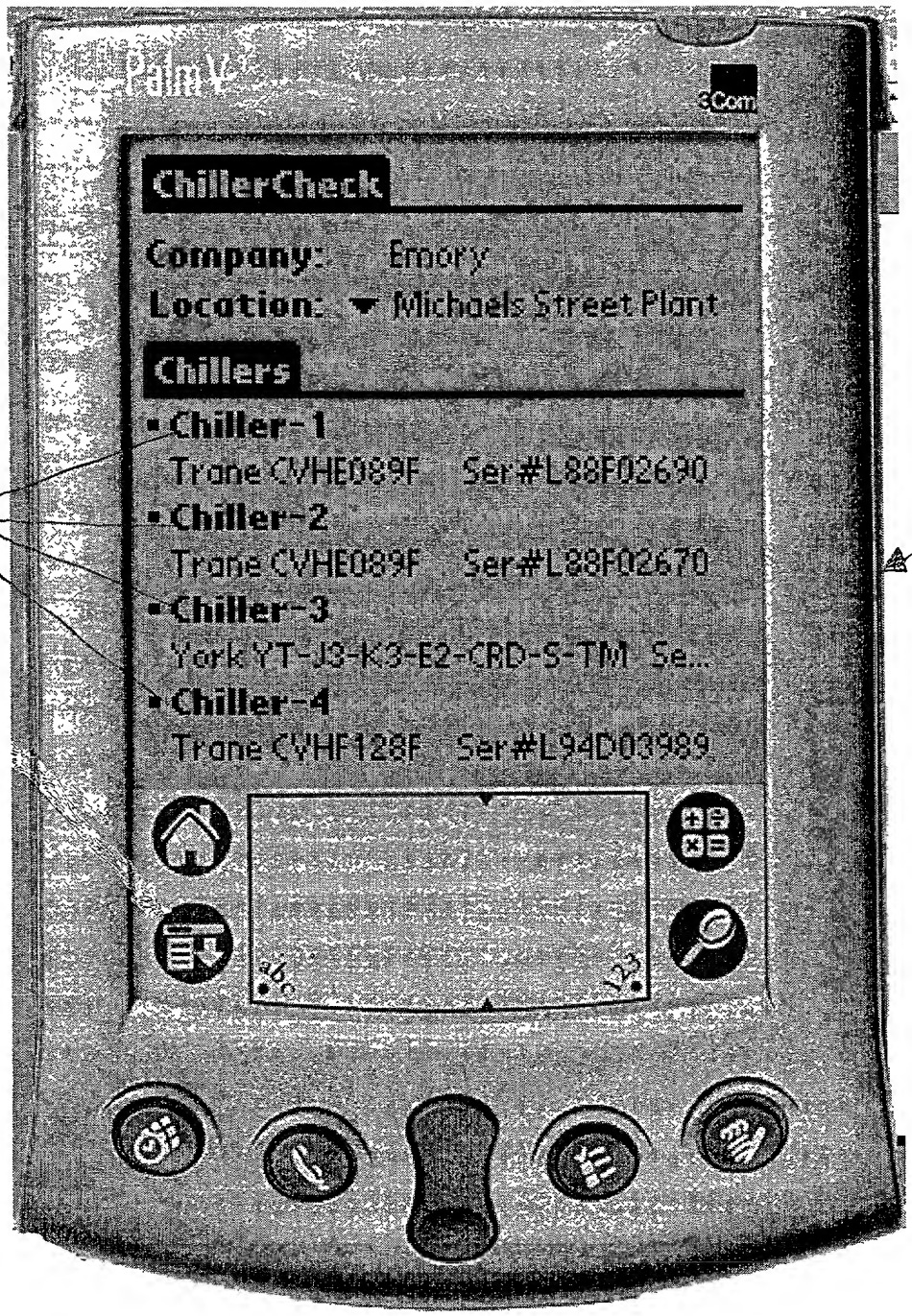
Palm V
3Com
ChillerCheck
Company: Emory
Location: Michaels Street Plant
Chillers
• Chiller-1
Trane CVHE089F Ser#L88F02690
• Chiller-2
Trane CVHE089F Ser#L88F02670
• Chiller-3
York YT-J3-K3-E2-CRD-S-TM Se...
• Chiller-4
Trane CVHF128F Ser#L94D03989
234
18

FIG. 13

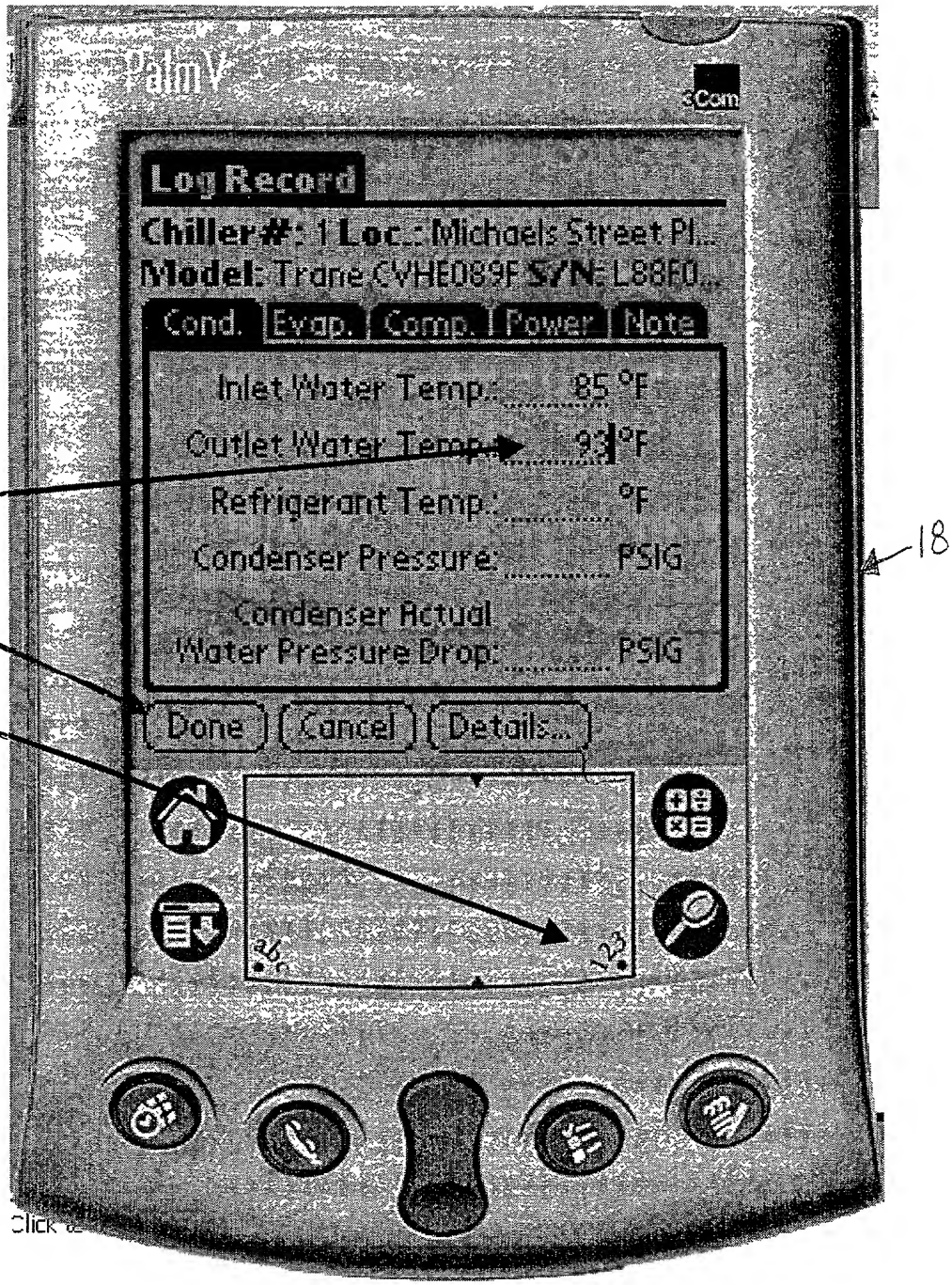
PalmV
3Com
Log Record
Chiller#: 1 Loc.: Michaels Street Pl...
Model: Trane CVHE089F S/N: L88E0...
Cond.
Evap.
Comp.
Power
Note
Inlet Water Temp.: 85 °F
Outlet Water Temp.: 93 °F
Refrigerant Temp.: °F
Condenser Pressure: PSIG
Condenser Actual Water Pressure Drop: PSIG
Done
Cancel
Details...
238
240
236
18

FIG. 14

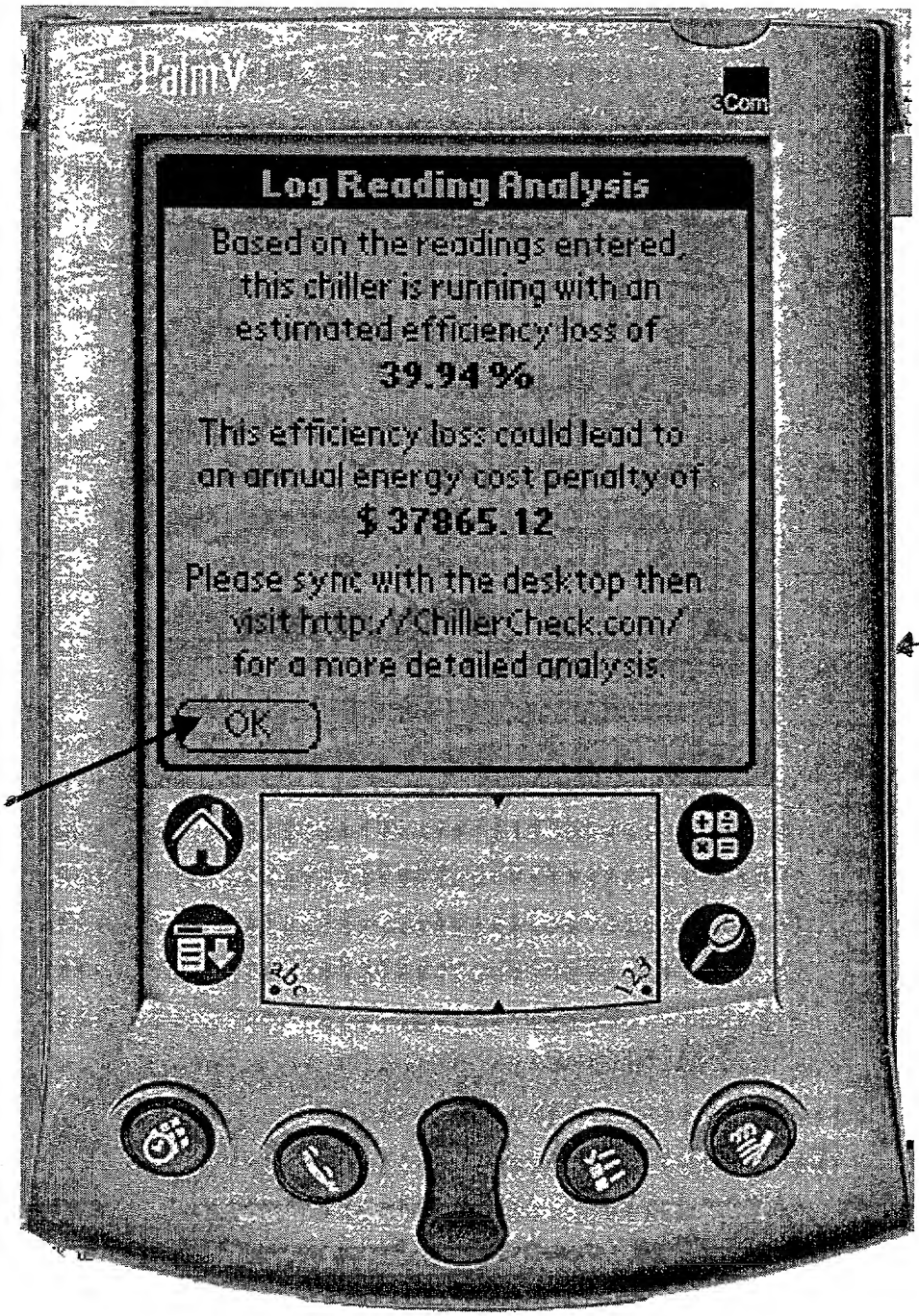
PalmV
3Com
Log Reading Analysis
Based on the readings entered, this chiller is running with an estimated efficiency loss of
39.94 %
This efficiency loss could lead to an annual energy cost penalty of
$ 37865.12
Please sync with the desktop then visit http://ChillerCheck.com/ for a more detailed analysis.
OK
242
18

FIG. 15

CHILLERCHECK.COM
Patent Pending

ChillerCheck Main | Chiller #1 Main Page | Maint. Records | Add Maint. Record | Add Log Record | View Logsheet | Chart Trends

Add Maintenance Record for Chiller #1 at Admin Bldg.

163 165 178 170 172

Please fill in all information in the form below, then click the "Add Maintenance Record" button.

You will then be taken back to the Maintenance page for this chiller.

Maintenance Information

Annual Maintenance Date:	Select a Month / Day / Year
Oil Maintenance	
Oil Change Date:	Select a Month / Day / Year
Date Oil Added:	Select a Month / Day / Year
Quantity of Oil Added (Gallons):	
Oil Analysis Date:	Select a Month / Day / Year
Eddy Current Tests	
Eddy Current Test Date (Condenser):	Select a Month / Day / Year
Eddy Current Test Date (Evaporator):	Select a Month / Day / Year
Major Stop Inspection (compressor teardown)	
Major Stop Inspection:	Select a Month / Day / Year
Refrigerant Maintenance	
Refrigerant Analysis Date:	Select a Month / Day / Year
Date Refrigerant Added:	Select a Month / Day / Year
Quantity of Refrigerant Added (Pounds):	
Tube Cleaning	
Condenser Tube Cleaning Date:	Select a Month / Day / Year
Evaporator Tube Cleaning Date:	Select a Month / Day / Year
Purge Maintenance	
Purge Tank Reclaim Date:	Select a Month / Day / Year
Purge Run Time Reading When Tank Reclaimed:	

FIG. 16A

Purge Filter Dryer Change Date:	Select a Month / Day / Year
Major Repairs	
Major Repair Date:	Select a Month / Day / Year
Major Repair Description:	
Notes	
Maintenance Notes: (You may enter a note about any type of maintenance.)	
Add Maintenance Record	

FIG. 16B

CHILLERCHECK.COM

Patent Pending

ChillerCheck Main | Chiller #1 Main Page | Maint. Records | Add Maint. Record | Add Log Record | View Logsheet | Chart Trends

Maintenance Records for Chiller #: 1 at Admin Bldg.

163 165 178 170 172

Below is a list of the most recent Maintenance Operations for your Chiller # 1. You may click on the name of a Maintenance Type to view all records of that type.

Maintenance Type	Most Recent Maintenance
Annual Maintenance:	October 18, 2001
Oil Maintenance	
Oil Change:	October 18, 2001
Oil Analysis:	October 1, 2001
Eddy Current Tests	
Condenser Eddy Current:	September 9, 2001
Evaporator Eddy Current:	September 10, 2001
Major Stop Inspection (compressor teardown)	
Major Stop:	January 3, 2000
Refrigerant Maintenance	
Refrigerant Analysis:	January 3, 2000
Refrigerant Added:	August 23, 2001 – Quantity: 100 Pounds
Tube Cleaning	
Condenser Tube Cleaning:	October 19, 2001
Evaporator Tube Cleaning:	February 5, 2000
Purge Maintenance	
Purge Tank Reclaim:	February 7, 2001 – Purge Run Time at Change: 1212123
Major Repairs	
Major Repair:	April 4, 2000 Repair Description: motor burnout
Maintenance Notes	
Notes:	November 5, 2001 Note: starter problems resulted in burnout

FIG. 17